

CLAIMS

What is claimed is:

- 5 1. An implantable cardiac stimulation device, comprising:
 a housing configured for subcutaneous non-intrathoracic placement in a
patient;
 energy delivery circuitry provided in the housing;
 detection circuitry provided in the housing;
10 one or more electrodes coupled to the energy delivery and detection circuitry
and configured for subcutaneous non-intrathoracic placement in a patient, the one or
more electrodes sensitive to cardiac and muscle activity; and
 a processor provided in the housing and coupled to the energy delivery and
detection circuitry, the processor detecting a arrhythmia using a cardiac signal
15 developed from the sensed cardiac activity and detecting an activity state of the
patient using an activity signal developed from the sensed muscle activity, the
processor modifying delivery of a therapy that treats the arrhythmia in response to
the activity signal.
- 20 2. The device of claim 1, wherein the processor inhibits delivery of the
arrhythmia therapy in response to the activity signal exceeding an activity threshold.
3. The device of claim 1, wherein the processor inhibits delivery of the
arrhythmia therapy in response to the activity signal indicating patient consciousness
25 or movement.

4. The device of claim 1, wherein the processor inhibits delivery of the arrhythmia therapy for a predetermined time period in response to the activity signal exceeding an activity threshold, and withholds delivery of the arrhythmia therapy
5 upon expiration of the predetermined time period and cessation of the arrhythmia.

5. The device of claim 1, wherein the processor inhibits delivery of the arrhythmia therapy for a predetermined time period in response to the activity signal exceeding an activity threshold, and delivers the arrhythmia therapy upon expiration
10 of the predetermined time period and non-cessation of the arrhythmia.

6. The device of claim 1, wherein the processor inhibits delivery of the arrhythmia therapy in response to the activity signal exceeding an activity threshold, and wherein the processor provides a notification that the arrhythmia therapy is
15 inhibited.

7. The device of claim 1, wherein:
in response to the activity signal indicating patient consciousness or movement, the processor inhibits delivery of the arrhythmia therapy; and
20 in response to detection of a life-threatening arrhythmia, the processor immediately delivers the arrhythmia therapy irrespective of the activity signal.

8. The device of claim 1, wherein the processor receives an electrocardiogram using the detection circuitry and discriminates the cardiac signal
25 and the activity signal from the electrocardiogram.

9. The device of claim 8, wherein the processor discriminates the cardiac and activity signals using a signal separation technique.

10. The device of claim 8, wherein the processor discriminates the cardiac and activity signals using blind source separation.

5 11. The device of claim 8, wherein the one or more electrodes comprises:
a first combination of electrodes adapted to preferentially sense cardiac signals associated with the cardiac activity; and
a second combination of electrodes adapted to preferentially sense noise signals associated with the muscle activity.

10 12. The device of claim 11, wherein:
the one or more electrodes comprises a plurality of electrodes;
the processor selects combinations of the plurality of electrodes; and
the processor senses a cardiac signal component and a noise
15 component of signals acquired by each of the controller selected electrode combinations.

20 13. The device of claim 1, wherein the processor detects the arrhythmia using morphology based arrhythmia detection.

14. The device of claim 1, wherein the processor detects the arrhythmia using rate based arrhythmia detection.

25 15. The device of claim 1, wherein the one or more electrodes comprise a plurality of electrodes, and wherein the processor detects the arrhythmia using an activation sequence over the plurality of electrodes.

16. The device of claim 1, wherein the processor detects the arrhythmia using a cardiac signal curvature.

17. A cardiac stimulation method, comprising:
5 detecting signals at one or more subcutaneous non-intrathoracic locations;
discerning a cardiac signal from the detected signals;
discerning an activity signal associated with muscle activity from the detected signals;
detecting a arrhythmia using the cardiac signal;
10 detecting a patient activity state using the activity signal; and
modifying delivery of a subcutaneous non-intrathoracic therapy that treats the arrhythmia in response to the activity signal.

18. The method of claim 17, wherein delivery of the arrhythmia therapy is
15 inhibited in response to the activity signal exceeding an activity threshold.

19. The method of claim 17, wherein delivery of the arrhythmia therapy is inhibited in response to the activity signal indicating patient consciousness or movement.

20. The method of claim 17, wherein delivery of the arrhythmia therapy is inhibited for a predetermined time period in response to the activity signal exceeding an activity threshold, and delivery of the arrhythmia therapy is withheld upon expiration of the predetermined time period and cessation of the arrhythmia.

21. The method of claim 17, wherein delivery of the arrhythmia therapy is inhibited for a predetermined time period in response to the activity signal exceeding an activity threshold, and the arrhythmia therapy is delivered upon expiration of the predetermined time period and non-cessation of the arrhythmia.

22. The method of claim 17, wherein:
in response to the activity signal indicating patient consciousness or movement, inhibiting delivery of the arrhythmia therapy; and
in response to detection of a life-threatening arrhythmia, immediately delivering the arrhythmia therapy irrespective of the activity signal.

23. The device of claim 17, wherein discerning the cardiac and activity signals comprises discriminating the cardiac and activity signals using a signal separation technique on the detected signals.

24. The method of claim 17, wherein discerning the cardiac and activity signals comprises performing a blind source separation on the detected signals.

25. The method of claim 17, wherein detecting the signals comprises detecting the signals using a plurality of electrodes provided at a plurality of non-intrathoracic locations, the electrodes selectively combinable to define a plurality of sensing vectors, and discerning the cardiac and activity signals comprises:

selecting a first sensing vector of the plurality of sensing vectors which is preferentially sensitive to signals associated with cardiac activity; and

selecting a second sensing vector of the plurality of sensing vectors which is preferentially sensitive to signals associated with the muscle activity.

26. The method of claim 17, wherein the muscle activity is indicative of patient movement, and discerning the activity signal comprises detecting an accelerometer signal indicative of the patient movement.

5 27. The method of claim 17, wherein the arrhythmia is detected using morphology based arrhythmia detection.

28. The method of claim 17, wherein the arrhythmia is detected using rate based arrhythmia detection.

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29. The method of claim 17, wherein the arrhythmia is detected using an activation sequence detected by a plurality of electrodes.

15 30. The method of claim 17, wherein the arrhythmia is detected using a curvature of the cardiac signal.

31. A cardiac stimulation device, comprising:
means for detecting signals at one or more subcutaneous non-intrathoracic locations;
5 means for discerning a cardiac signal and a muscle activity signal from the detected signals;
means for detecting a arrhythmia using the cardiac signal;
means for detecting a patient activity state using the activity signal; and
means for modifying delivery of a subcutaneous non-intrathoracic therapy that
10 treats the arrhythmia in response to the activity signal.

32. The device of claim 31, wherein the delivery modifying means comprises means for inhibiting arrhythmia therapy delivery in response to the activity signal.

33. The device of claim 32, wherein the delivery modifying means comprises means for immediately delivering the arrhythmia therapy in response to detecting a life-threatening arrhythmia irrespective of the activity signal.

34. The device of claim 31, wherein the discerning means comprises means for separating the cardiac and activity signals respectively from the detected signals.

35. The device of claim 31, wherein the discerning means comprises means for acquiring an accelerometer signal indicative of patient movement.